the central one having the highest intensity, and the tension diminishing in the successive zones surrounding the innermost, till it became inappreciable in the one most remote; the author considers this condition of the cloud to be analogous to that of the battery above described, and the phenomena of the former to receive complete illustration from the experimental results obtained with the latter.

January 20, 1848.

GEORGE RENNIE, Esq., Treasurer, in the Chair.

"On the Heat disengaged during Metallic Substitutions." By Thomas Andrews, M.D., M.R.I.A., Vice-President of Queen's College, Belfast, &c. Communicated by Michael Faraday, Esq., D.C.L., F.R.S. &c.

In a paper which was published in the Philosophical Transactions for 1844, the author deduced from the experimental inquiry there recorded the general law, that when one base displaces another from any of its neutral combinations with an acid, the heat evolved or abstracted is always the same, whatever that acid element may be, provided the bases are the same. Extending a similar inquiry to salts with metallic bases, he establishes, as the result of the investigation of which an account is given in the present paper, the general principle that when an equivalent of one and the same metal replaces another in a solution of any of its salts of the same order, the heat developed is, with the same metals, constantly the same, the expression "of a solution of the same order" being understood to mean a solution in which the same precipitate is produced by the addition of an alkali, or, on one view of the composition of such salts, in which the metal exists in the same state of oxidation. The metallic salts, in the precipitation of which by other metals the evolved heat was ascertained, were those of copper precipitated by zinc, iron or lead; of silver, precipitated by zinc or copper; and of lead, mercury, and platinum precipitated by zinc: and the acid elements were either the sulphuric, hydrochloric, acetic or formic acids. From the last series of experiments the author deduces, that if three metals A, B, and C, be so related that it is capable of displacing B and C from their combinations, and also B capable of displacing C, then the heat developed in the substitution of A for C will be equal to that developed in the substitution of B for C; and a similar rule may be applied to any number of metals similarly related.

January 27, 1848.

GEORGE RENNIE, Esq., Treasurer, in the Chair.

"On Galvanic Currents existing in the Blood." By James Newton Heale, Esq., Licentiate of the Royal College of Physicians, and